

TAIO  
DEVAN

**PUBLIC PRIVATE PARTNERSHIPS-**  
**RISK MANAGEMENT IN ENGINEERING**  
**INFRASTRUCTURE PROJECTS**

**By**

**D.V.G. DEVAN**

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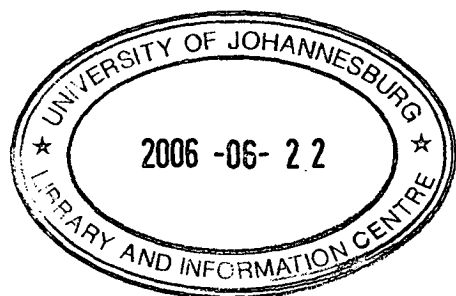
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## PREFACE

*“South Africa is proudly amongst the leading countries in the world in the law, policy and systems we have established for public private partnerships. Our public service delivery record has been enriched through PPPs in recent years, and our PPP project pipeline continues to grow, both in numbers and in the innovative value-for-money solutions it contains.”*

**Trevor A. Manuel – Minister of Finance, Republic of South Africa**

# **TABLE OF CONTENTS**

<b>TOPIC</b>	<b>PAGE</b>
<b>ACRONYMS AND SCHEDULE OF FIGURES AND TABLES</b>	<b>5</b>
<b>ABSTRACT AND RESEARCH OBJECTIVES</b>	<b>6</b>
<b>CHAPTER 1 -OVERVIEW OF PUBLIC PRIVATE PARTNERSHIPS</b>	<b>9</b>
1.1 BACKGROUND	9
1.2 DEFINITION OF PUBLIC PRIVATE PARTNERSHIPS	10
1.3 PARTIES INVOLVED IN A PPP	11
1.4 FEATURES OF PPP	13
1.5 BENEFITS OF PPP	14
1.6 SUMMARY	16
<b>CHAPTER 2 -THE PPP PROJECT LIFE CYCLE AND ITS ASSOCIATED RISKS</b>	<b>17</b>
2.1 BACKGROUND	17
2.2 RESPONSIBILITIES AND RISKS DURING PPP PROJECT LIFE CYCLE	18
2.3 STAGES IN A PPP PROJECT LIFE CYCLE	18
2.4 ASSESSING DESIGN, CONSTRUCTION AND COMMISSIONING RISK	19
2.5 PRIORITISATION OF RISKS BY PPP PARTICIPANTS	23
2.6 SUMMARY	24
<b>CHAPTER 3 -RISK MANAGEMENT</b>	<b>25</b>
3.1 BACKGROUND	25
3.2 RISK IDENTIFICATION	26
3.3 RISK IDENTIFICATION METHODS	33
3.4 SUMMARY	38
<b>CHAPTER 4 -RISK EVALUATION</b>	<b>39</b>
4.1 BACKGROUND	39
4.2 TYPES OF RISK EVALUATION	40
4.3 ASSESSING THE PROBABILITY OF RISKS	41
4.4 ASSESSING THE IMPACT OF RISKS	41
4.5 RISK ASSESSMENT STRATEGIES	41
4.6 RISK MITIGATION	46
4.7 THE ROLE OF ATTITUDES IN RISK MITIGATION	50
4.8 SUMMARY	50
<b>CHAPTER 5 - RESEARCH OF OPINIONS FROM STAKEHOLDERS PREVIOUSLY INVOLVED IN PPP</b>	<b>52</b>
5.1 BACKGROUND	52
5.2 COMMENTS FROM NIGEL LOWE	52
5.3 INVESTIGATION AT GLASGOW CALEDONIAN UNIVERSITY ON RISK MANAGEMENT IN PPPS	53
5.4 COMMENTS FROM ELECTRONIC DISCUSSION FORUM –CANCELLATION OF PPP PROJECTS	56
5.4 SUMMARY	59
<b>CHAPTER 6 - CONCLUSION AND RECOMMENDATIONS</b>	<b>60</b>
<b>LIST OF REFERENCES</b>	<b>63</b>

## **ACRONYMS**

PPP - PUBLIC PRIVATE PARTNERSHIPS

SPV – SPECIAL PURPOSE VEHICLE

APOPS – ASSET PROCUREMENT AND OPERATIONS SYSTEMS

FM – FACILITIES MANAGEMENT

IE – INDEPENDENT ENGINEER

IT – INDEPENDENT TESTER

DTI – DEPARTMENT OF TRADE AND INDUSTRY

JV – JOINT VENTURE

PMI - PROJECT MANAGEMENT INSTITUTE

## **FIGURES AND TABLES**

FIGURE 1.1 – ORGANOGRAM OF CONTRACTUAL RELATIONSHIPS OF PARTIES IN A PPP PROJECT

TABLE 2.1 - RANKING OF PPP RISKS BY CONTRACTORS, CLIENTS AND LENDERS

FIGURE 3.1 - THE RISK MANAGEMENT PROCESS

TABLE 4.1 – RISK ASSESSMENT CLASSIFICATION

FIGURE 4.1 - PRIORITISATION OF RISKS

## **ABSTRACT AND RESEARCH OBJECTIVES**

Economic growth and the provision of ~~adequate infrastructure~~ are highly interrelated. ~~Infrastructure plays a critical role in promoting economic growth through enhancing productivity,~~ improving competitiveness, reducing poverty, linking people and organisations together through telecommunications and contributing to environmental sustainability. Population growth and rapid urbanisation have placed enormous pressure on existing infrastructure, thus presenting a daunting challenge to governments worldwide[1].

The scope of global demographic, public health and safety needs, as well as economic development goals, translates into infrastructure requirements far in excess of currently available financing resources. While the degree of this funding backlog differs from country to country, it extends from the poorest to the richest of nations. This is true even in the United States, which enjoys the full benefits of decentralized government responsibility and an extensive domestic debt market. Recognition of this funding gap has resulted in a nearly universal acceptance that the private sector can and should play a larger role in the financing of infrastructure in partnership with the public sector [35].

The 1990s saw a revolution in the provision of infrastructure services as governments worldwide turned to the private sector for financing and management expertise. In developing countries in 1990 –2001, nearly 2,500 infrastructure projects involved private participation, attracting investment commitments of US\$750 billion [40].

South Africa has an estimated infrastructure backlog of R 170.7 billion [3]. In addition there is increasing demand for much-needed new and improved infrastructure such as water supply and sanitation systems, affordable housing and electricity supply, health care facilities, schools, roads, tourism infrastructure, airports and harbour facilities, to name but a few [4].

With the private sector organisations having a large pool of sources from which they can seek funding from both local and international financial markets and the government having fragmented expertise over different state departments, debilitating red tape and bureaucracy, more pressing needs for funding elsewhere and inability to roll out projects, private sector involvement in infrastructure provision has been widely considered and implemented as a preferred method of financing infrastructure provision. This collaboration between public and private sectors is crucial in order to increase the

sources of funding available for infrastructure and reduce the pressure on fiscal budgets.

This has resulted in an increased collaboration between the public and private sectors in order to meet a country's infrastructure requirements. Consequently, the Public Private Partnership (PPP) procurement method of undertaking large infrastructure projects is becoming a realistic option. An appropriate current example of this collaboration between the public and private sectors is the new Gautrain Rapid Rail project being undertaken by the Gauteng Provincial Government.

The PPP method of procurement impacts on Engineers and Project Managers in the Built environment field in many ways. It changes the way they are appointed, their roles and responsibilities, the constraints and parameters of their design and the commercial aspects of project managing these projects.

The involvement of the private sector in public sector infrastructure delivery has long been debated, with attempts at privatisation and deregulation being partially successful. There is now a global shift towards the PPP model [34].

## **RESEARCH OBJECTIVES**

The research objectives of this dissertation, therefore, are to conduct an extensive literature search of information and documentation on this topic to be able to:

- Appreciate the fundamentals of this relatively new method of procurement for the large and complex engineering infrastructure projects
- Present the experiences of stakeholders having worked on PPP projects in other countries that have been using this method of procurement longer than South Africa
- Identify the unique risks that vest in this method of procurement so that, as practitioners in the Built Environment, we are more prepared to identify, assess and mitigate these risks.

The research presented in this paper is a result of an extensive literature search from various textbooks, journals, articles, web-sites and discussions with professionals from the Built Environment regarding the topic at hand. It must be noted that, as the PPP method of procurement is in its nascent stages in relation to other forms, relevant and suitable information is limited.

This dissertation paper is structured as follows:-

There is an initial overview of Public Private Partnerships encompassing the definition of PPPs, the different parties involved, their unique features and benefits. Thereafter the PPP Project Life Cycle, including the different roles and responsibilities of the different parties through the Project Life Cycle is discussed. Thereafter, a detailed analysis of risk management is undertaken with specific references to risk identification, risk evaluation and risk mitigation, against the backdrop of a PPP project. The next section consists of comments and observations from international stakeholders with experience in PPPs. The dissertation paper is then concluded with a set of recommendations.



# CHAPTER 1 – OVERVIEW OF PUBLIC PRIVATE PARTNERSHIPS

## 1.1 BACKGROUND

Economic growth and the provision of adequate infrastructure are highly interrelated. Infrastructure plays a critical role in promoting economic growth through enhancing productivity, improving competitiveness, reducing poverty, linking people and organisations together through telecommunications and contributing to environmental sustainability. Population growth and rapid urbanisation have placed enormous pressure on existing infrastructure, thus presenting a daunting challenge to governments worldwide. [1]

Most infrastructure expenditure in developing countries has been funded directly from the fiscal budgets. However, several factors such as macroeconomic instability and growing investment requirements (particularly following the debt crisis of the 1980s), have shown that public financing is volatile and, in many countries, rarely meets crucial infrastructure expenditure requirements in a timely and adequate manner [2].

Private sector organisations on the other hand, have a large pool of sources from which they can seek funding from both local and international financial markets. Governments may not have access to, or the capacity to access, all these sources of funding. As a result, private sector involvement in infrastructure provision has been widely considered and implemented as a preferred method of financing infrastructure provision. This collaboration between public and private sectors is crucial in order to increase the sources of funding available for infrastructure and reduce the pressure on fiscal budgets [1].

South Africa has an estimated infrastructure backlog of R 170.7 billion [3]. In addition there is increasing demand for much-needed new and improved infrastructure such as water supply and sanitation systems, affordable housing and electricity supply, health care facilities, schools, roads, tourism infrastructure, airports and harbour facilities, to name but a few [4].

In addition, fragmented expertise over different state departments, debilitating red tape and bureaucracy, more pressing needs for funding elsewhere and inability to roll out projects are only some of the factors contributing to the government's inability to deliver basic services. This problem is not unique to South Africa.

In view of these factors, the government is constantly seeking alternative methods of financing new infrastructure and maintenance of existing engineering infrastructure assets.

The involvement of the private sector in public sector infrastructure delivery has long been debated, with attempts at privatisation and deregulation being partially successful. There is now a global shift towards the PPP model [38].

## 1.2 DEFINITION OF A PUBLIC PRIVATE PARTNERSHIP

Although it is difficult to accurately define, a Public Private Partnership (PPP) is essentially a contractual arrangement between a public sector entity and a for-profit private sector concern, where the contracting parties contribute their expertise and resources to deliver a public service by utilising the economies of the private sector to deliver more effectively the service or infrastructure.

The Canadian Council for Public Private Partnerships (1998) defines a PPP as a co-operative venture between the public and private sectors, built on the expertise of each partner that best meets clearly defined public needs through the appropriate allocation of resources, risks and rewards [41].

The South African National Treasury defines a PPP as “ A contract between a public sector institution and a private party, in which the private party assumes substantial financial, technical and operational risk in the design, financing, building and operation of a project”.

A good working definition for a public-private partnership would include three points:-

- these partnerships involve at least one private for-profit organization and at least one not for profit or public organization.
- the partners have some shared objectives for the creation of social value, often for the disadvantaged populations.
- the core partners agree to share both efforts and benefits.

PPPs are diverse in many respects with the number of partners involved, the kinds of organizations involved, the funding levels and funding sources, the objectives for the partnerships and the organizational structures of the partnerships varying according to the project.

Examples of such projects undertaken in South Africa include the N3 Toll Road between Johannesburg and Durban, the first privately

operated Mangaung Maximum Security Prison in Bloemfontein and the soon to be constructed Gautrain Rapid Rail Link between Johannesburg and Pretoria.

### **1.3 PARTIES INVOLVED IN THE PPP**

The following entities are typically parties to a PPP:

- A government department acting as the Client
- A government department acting as Agent to the Client department
- A Special Purpose Vehicle (SPV) consisting of a group of private sector corporate entities coming together specifically to design, build and operate the facility
- A financial institution that provides the private sector with financial support
- A construction sub-contractor that designs and builds the facility
- An operations sub-contractor that operates the facility
- A facilities management sub-contractor that maintains the facility

Generally, a Government department, realising that there is a need for a service to be rendered and for large capital infrastructure to be built, and realising the various constraints it currently is beset with, advertises for private entities to present a proposal of how they would be able to construct the infrastructure and service required. There would be an appropriate Government department representing the interests of the Client Government department's interests, for example the Department of Public Works acted as Agent on behalf of the Department of Correctional Services in the Mangaung Prison project. This Agency then appoints professionals from the legal, financial, technical and operational fields to advise it and prepare the necessary documentation and output specifications for interested parties to respond to.

Interested entities then partner one another and form a Special Purpose Vehicle (SPV) and submit their respective proposal in response to the output specifications.

The choice of a preferred bidder is made after a comprehensive process, after which the winning bidder contracts with the Government department to undertake the project.

The SPV and would comprise a party to design and build the facilities and a party to operate and maintain the facility. A new entity in the form of a SPV is generally the preferred way of contracting with government as the risk is negotiated between the government and a

single private entity. The SPV has legal recourse back to Government through the conditions of the contract.

It is the private SPV that employs the services of professionals from the Built Environment to undertake the feasibility of the project, the design and specifications of the project, the construction and maintenance of the project. The appointment of the professionals is generally on a sub-contract basis where the engineering services are subcontracted out to the SPV.

Figure 1.1 is a diagrammatical representation of the contractual relationship between the various parties to a PPP

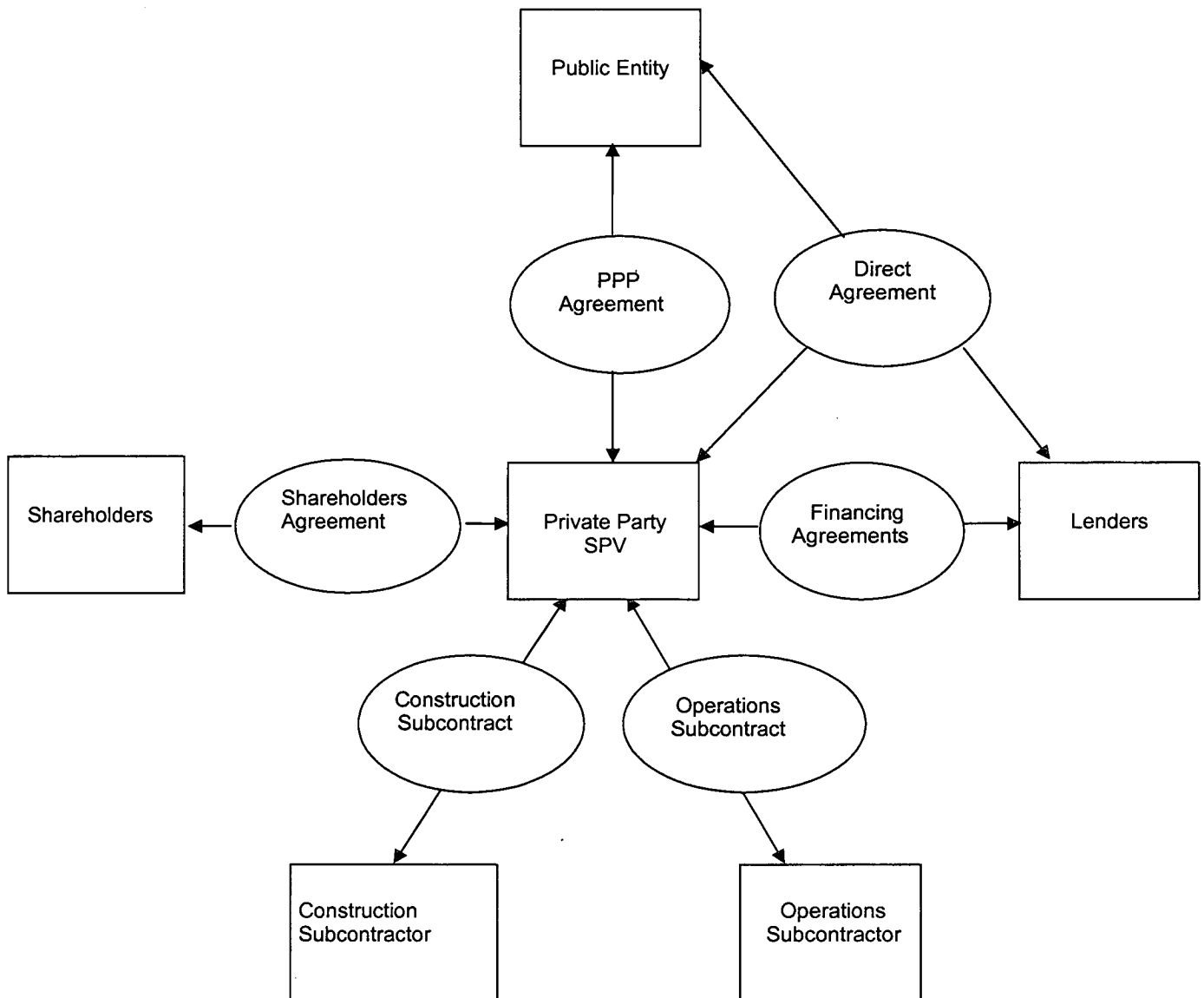


Fig. 1.1

**ORGANOGRAM OF CONTRACTUAL RELATIONSHIPS OF PARTIES IN A PPP PROJECT [42]**

important or key

## 1.4 FEATURES OF A PPP

A PPP is effectively a partnership between the public sector and the private sector and in attempting to obtain an appreciation of a PPP, it is useful to explore the features of a partnership.

Peters (1998) [5] identified five general defining features of partnerships:

- 1.4.1 A PPP involves two or more actors at least one of which is public and another from the private sector.
- 1.4.2 In a PPP, each participant is a principal. Each of the parties are capable of bargaining on their own behalf, rather than to refer back to other sources of authority. In some instances the public sector has to set up a special agency capable of entering into partnerships before collaboration becomes possible [6]. An example of this is when the South African Government was undertaking the PPP for its first privately operated prisons, it established a special government agency, APOPS, to partner the private sector through the project.
- 1.4.3 The partners establish an enduring and stable relationship. There is a continuing relationship, the parameters of which are negotiated among the members from the outset [7].
- 1.4.4 Each of the parties brings something to the partnership [8]. Therefore for the partnership to be genuine, each will have to transfer something, either material or immaterial to the partnership. The transfer of material resources (money or land, etc.) is rather obvious [9]. The transfer of other resources, such as authority and any other symbolic values [10], can constitute a less obvious form of partnership.
- 1.4.5 The partnership implies that there is some shared responsibility for the outcomes and activities [8]. This differs from other relationships between the public and the private sectors in which the public sector retains control over policy decisions after receiving the advice of organisations in the private sector. In contrast, actual partnerships produce mutual shared responsibility, which can make accountability for these decisions difficult to ascertain.

When the public and private entities first come together, there are generally different perceptions of each other, where the private firms are seen to be primarily seeking future profits and markets through partnerships, or to be seeking control over the agendas of public organisations, or to be using donations to claim tax deductions for financial reasons. The private sector enters the partnership with the

perception of having a superior skills and resource base in comparison to the public sector.

In as much as private firms are primarily profit seeking organizations, the realisation that their effective participation by adding value to the better interests of the public at large soon allays the initial hostilities and the tensions are soon replaced by increasing rapprochement and positive encouragement. A chief factor encouraging these partnerships is that neither side alone can achieve its specific goals and only through positive collaboration can certain key infrastructure problems be solved.

Constructing an effective partnership among diverse organizations is hard work. Partnerships face seven organizational challenges, what Austin (2000) [12] calls the seven Cs, which are:

- Clarity of purpose
- Congruency of mission, strategy and values
- Creation of value
- Connection with purpose and people
- Communication between partners
- Continual learning
- Commitment to the partnership

Of particular importance is the challenge of creating value. To assure a sustainable collaboration, the value created must be useful to society, and value must flow to all partners. In addition, creating a partnership is a continual learning process, with the potential for unexpected lessons.

*Advantages*

## **1.5 BENEFITS OF PPP \***

Generally, it is becoming more and more accepted that the PPP procurement method has definite benefits to both the public and private sector.

Below are the salient points extracted from a detailed analysis of potential benefits of PPP as listed in a report from the Nova Scotia Government (NS 2000 – Review of Public Private Partnerships): [11]

### **1.5.1 Enhance the government's capacity to develop integrated solutions**

PPPs provide government an opportunity to undertake larger projects that previously would have been broken up into smaller projects under conventional procurement methods. This allows

government to ensure an integrated solution to larger social and public needs and issues.

### **1.5.2 Facilitate creative and innovate approaches**

The PPP process allows private designers and engineers to produce innovative solutions to the problems presented by public services as this method of procurement does not depend on a detailed definition of input specifications but rather a set of performance and output specifications. The private bidders are then allowed to compete on a basis of their ability to develop unique creative approaches to the delivery of the required project.

### **1.5.3 Reduce the cost to implement the project**

A PPP procurement approach offers the potential benefit of reducing costs, often significantly, or delivering higher quality for the same cost, both for the design and build phase and for the operations phase. Research undertaken by Arthur Anderson and Enterprise LSE (2000), claimed that the average saving resulting from a PPP is 17% [41]. The cost reductions can be attributed to synergies, economies of scale and reductions in life-cycle costs [11].

### **1.5.4 Reduce the time to implement the project**

The primary reason for a reduction in the time in the implementation of PPP projects is because the design and construction processes are undertaken concurrently rather than sequentially, and with the design being the responsibility of the private sector SPV, the temptation to make ongoing design changes to the project design is discouraged in the PPP process. These changes can easily cause delays and cost overruns. These projects generally include incentives that reward the private party for on-time completion and the PPP process generally reduces the number of times a Government project goes out to tender, where if the public sector undertook a large infrastructure project, the typical procurement process will entail the project being broken down into smaller packages and spread over different departments and financial years with the initiation of each phase being tied to a multi-year capital plan.

### **1.5.5 The transfer of certain risks to the private project partner**

A fundamental aspect of the PPP method of procurement is that a considerable amount of risk is transferred from the public sector to the private sector. These risks include the design, construction and operational risks (both cost and performance)

### **1.5.6 Attract larger, potentially more sophisticated, bidders to the project**

The huge commercial potential vested in these PPP projects resulting from the sheer size of the project, the length of the concession period and the greater exposure to a public market creates an extremely competitive environment for the larger and more sophisticated bidders. This context also encourages and motivates bidders to propose new and more attractive terms for the deal.

### **1.5.7 Access skills, experience and technology**

As a partnership is formed between the public and private sector entities when a PPP project is undertaken, Governments are able to gain new skills, technology and knowledge as a result of the extensive interaction and involvement in all aspects of the project. This interaction allows Government to expand their expertise and knowledge base beyond their normal procurement and development systems and be exposed to new and innovative methods. Government entities are also exposed to the commercial aspects of a project through their involvement in the decision-making process during the PPP project.

## **1.6 SUMMARY**

The increasing pressure on government to deliver large infrastructure projects due to, amongst other factors, economic and population growth, and the increasing pressure on government to utilize the public funds it has at its disposal for other more pressing public social needs have resulted in the government seeking respite from the private sector to partner them in the delivery of the services desperately required. The distinct features and benefits described above of the PPP method of procurement have enabled the PPP method to consistently grow into the preferred method of procurement for government for the larger infrastructure projects.

The PPP method also has distinct and unique risks and responsibilities associated with it and the actual implications of those risks and responsibilities to the professionals in the Built Environment in the implementation of this method is discussed at length in the subsequent chapters.



# **CHAPTER 2 – THE PPP PROJECT LIFE CYCLE AND THE ASSOCIATED RISKS**

## **2.1 BACKGROUND**

The Project Management Institute (PMI) has defined a project as “a temporary endeavour undertaken to create a unique product or service” [33]. Temporary means that every project has a definite beginning and a definite end. Unique means that the product or service is different in some distinguishing way from all other products or services. For many organizations, projects are a means to respond to those requests that cannot be addressed within the organization’s normal operational limits [38].

A project is usually a one-time activity with a well-defined set of desired end results. It can be divided into subtasks that must be accomplished in order to achieve the project goals. The project is complex enough that the sub-tasks require careful co-ordination and control in terms of timing, precedence, cost, and performance. Often, the project itself must be co-ordinated with other projects being carried out by the same parent organisation [33].

In relation to the definitions above, the actual way in which construction projects are managed may not change significantly in a PPP setting and if a project has a particular design and method statement, then two construction contractors can very easily produce two construction projects with relatively similar outcomes.

The primary distinguishing characteristic between a PPP construction product and a non-PPP product is the procurement procedure. However the risks in a particular PPP project are higher than if that same project were not done via PPP. The reason being that the scope of responsibilities of the participants in a PPP project are higher than in non-PPP projects [13]. There is a significant transfer of design and operational and commercial risk from the public sector to the private sector

In essence, the private sector partners in a project undertake to design, build, finance and operate facilities to achieve the objectives of a client with respect to service delivery. To achieve these objectives, the private sector entity forms a Special Purpose Vehicle (SPV), which then contracts with other private sector organizations for the design, construction, operation and maintenance of the facilities required to provide the public service. This effectively results in a significant portion of the project risks being transferred to the SPV, who then further routes the different risks to the appropriate private entity within the SPV.

## 2.2 RESPONSIBILITIES AND RISKS DURING PPP PROJECT LIFE CYCLE

The extent of the roles and responsibilities of both public and private sectors could vary in different PPP projects. However, the public sector always retains responsibility for the deciding of the nature of services to be provided, the quality and performance standards of these services to be attained, and taking corrective action if performance falls below expectation [16]. However, within the SPV, the different private entities have varying responsibilities and subsequent risks through the project life cycle and each one of these private parties will view the project risks with different objectives.

The SPV mitigates the possible consequences of design, construction and commissioning risks by apportioning elements of the risk to its design and construction sub-contractors through their indemnity insurers. The design and construction sub-consultants undertake works of which they are familiar with and are used to dealing with the consequential risks.

Notwithstanding this cascading down of risks, the SPV retains the primary liability for the particular risk under the contract with Government. If a risk eventuates, the SPV will seek to meet the costs by calling on the professional indemnities of the sub-contractors.

Although design and construction risk is essentially borne by the Private Party, materialised risk events impact on Government in the form of delays or interruptions to service and/or less efficient service. In these circumstances, it is in the interests of all parties to actively manage risks. However, Government needs to be careful not to become overly involved in the management of risks and in doing so, assume risks allocated to the Private Party [39].

## 2.3 STAGES IN A PPP PROJECT LIFE CYCLE

The PPP project cycle consists of the following stages:

- Inception
- Feasibility Study
- Procurement
- Development
- Delivery
- Exit

*www.dbsa.org / Research / Doc of Pu Pri Part in the trans Sector.doc*

Within these stages are the design, construction, operational and maintenance phases which involve the Built Environment professionals.

### **2.3.1 The Design stage**

As the output specifications are provided by the public sector Client, the responsibility of the design of all aspects of the facility required to provide the public service lies with the private sector partner. It is this specific aspect of PPP that allows the private sector to produce innovative and economically efficient systems to provide the public service. This responsibility gives rise to a set of risks that the private sector entities would not have been exposed to in a conventional procurement contract with a public sector entity. Typical sources of risk attributable to design include incomplete and delayed drawings. These sources of risk are not the responsibility of the Client under a PPP contract.

### **2.3.2 The Construction stage**

Since the public sector specifies the public service to be provided in terms of an output specification, the private sector has the latitude to introduce innovative ways to construct the required facility. Thus construction facilities serve as a means to an end towards delivering the clients' expected services. This leeway, which contrasts with traditional construction procurement, allows bidders to innovate in designing any needed facilities that will enhance the provision of services. This construction aspect is high risk [17].

### **2.3.3 The Operational/ Facilities Management stage**

Facilities management (FM) is of great importance and prominence in PPP projects. Even at inception stages, sponsors are expected to consider the life-cycle cost commitments of a project [18]. As service contracts in PPP schemes are of long durations, an element of uncertainty will always surround FM in PPP deals. This consists of a relatively low-risk utility aspect [17].

## **2.4 ASSESSING DESIGN, CONSTRUCTION AND COMMISSIONING RISK**

The greatest risks of PPP projects occur at the later part of construction and early part of operation of the facility [17].

Design, construction and commissioning risk is the risk that the design, construction or commissioning of the facility or certain elements of each of these processes, are carried out or not carried out in a way which results in adverse cost and/or service delivery consequences. The consequences if the risk materializes may include

delays and/or cost increases in the design, construction and commissioning phases, or design or construction flaws which may render the infrastructure inadequate for effective service delivery, either immediately or over time [39].

Under the conventional approach, the Government usually appoints professionals to design a facility according to a set of input specifications and the Government would then appoint a Construction company to construct the facility with the design professionals monitoring the works on behalf of the Government to ensure that the construction and installation is as per the design drawings and specifications. Payments are then made to both the design professionals and the Contractor at various stages of completion. In addition, the Contractor usually does not have an ongoing responsibility to maintain or service the facility.

In the PPP method of procurement, the private sector entities, which include the design professionals and the construction sub-contractor, usually incur substantial up-front design and construction costs to develop the facility. Any unanticipated increase in these costs, whether through delay or otherwise has to be borne by the private sector and, may have a significant impact on the financial outcomes of the project and/or the delivery of services.

Although there are some similarities between the development obligations imposed on the Private Party in a PPP contract and the builder in a public procurement, there are likely to be critical differences. As noted earlier, under the PPP policy, Government is not necessarily procuring the asset but focusing on the services delivered through it. This means that:

- Government makes no payment during the design and construction period;
- The scope for Government-initiated change to design and construction processes is likely to be limited;
- Government rights during design, construction and commissioning are likely to focus on reporting and monitoring rather than the broader rights exercised under a design and construct contract;
- 'Commercial acceptance' is likely to take the place of 'practical completion', i.e. acceptance by Government that service delivery (to agreed service standards) from a technically complete facility can begin and, therefore, so can payment of service charges; and
- If there are defects, correction of these during a specified 'defects liability' period are likely to be less relevant to Government, as payment will most likely be abated if the

service falls short of the specified outputs as a result of the defects [39].

With respect to commissioning, completion of works generally occurs when the capital works and service outputs are tested under the full range of operating environments (i.e. commissioning and operational commissioning) indicating that the facility is in a position to deliver the full set of services in accordance with the output specification. A Certificate of Completion is issued to formally accept the condition of the construction and installation of the services at the facility.

A significant dilemma facing the public sector is the objectivity and authenticity of the testing and commissioning undertaken by professionals that are employed by the private sector. The South African government have employed the services of an Independent Engineer (IE) to oversee this process during the testing and commissioning at the first privately operated prison in Bloemfontein that was procured through the PPP method. The IE is an independent organization of professionals representing all the relevant disciplines of the Built Environment who engage with the professionals from the private sector and review their designs and physically witness the testing and commissioning process and issue a certificate of acceptance.

When the new Head Offices for the Department of Trade and Industry was procured through the PPP method, an Independent tester (IT) was appointed to conduct the independent reviews and inspections. The IT was jointly appointed by the private and public sector entities.

Design, construction and commissioning risk is implicitly allocated to the Private Party by the nature of a PPP project. If Government imposes detailed obligations on the Private Party relating to the design, construction and commissioning of a project, the risk allocation to the Private Party is jeopardized, as is the Private Party's ability to make decisions about how best to manage these risks. Government will most likely not assume or in any way share design, construction and commissioning risk with the Private Party, unless it is a risk associated with a Government-initiated design or construction change, or a discriminatory act or omission by Government which is not in accordance with a Government law, regulation or policy (that has previously been advised to the Private Party) during the design and construction process [39].

#### **2.4.1 Unintentional design risk assumption**

The public sector ensures that the financial consequences resulting from delays in design or construction or of any failure to meet the agreed standards rests squarely with the private sector party by:

- Confirming upfront the price to be paid for the services to be delivered and agreeing to make payment only once the service is delivered to the satisfaction of the public party;
- Contractually ensuring that the circumstances in which the contract term may be extended is exceptional; and
- Ensuring that there is a mechanism in the contract to address the issue of agreed damages for late delivery.

It can be difficult for Government to maintain the balance between communicating its needs by clearly specifying service outputs, and standing back from direct involvement in the design and construction process so that it does not intentionally assume design and construction risk [39]. This is especially so if the services delivered under the contract are accommodation services providing the functional space from which Government itself will deliver core services. Unless Government clearly conveys its functional requirements for particular areas, the contract may not succeed in delivering the accommodation services to the level or suitability necessary to ensure efficient delivery of core services from the facility. Government needs to secure a level of confidence in the suitability of the design to meet the outputs specified, so as to avoid making the allocation of design risk to the Private Party ineffective. The onus of ensuring that the design is capable of delivering the specified outputs must remain with the Private Party. It is imperative that no action taken by Government can be construed as offering assurances as to the efficacy of a design and so discharge the onus on the Private Party [39].

#### **2.4.2 Unproven Technology**

One of the key features of a PPP project is the fact that it offers the private party entity the opportunity for innovative solutions. This innovation brings with it the possibility that the new systems may not be able to deliver as expected or may need to be adjusted and refined. Although the risks resulting from this innovation falls primarily on the Private Party, the public sector also bear the risks that full service provision will not be achieved according to stipulated output specifications and timeframes.

#### **2.4.3 Keeping Pace with Technological Change**

The concession period of a PPP project is generally 20 years or more. This exceptionally long project life requires that the design and construction of the facility and its systems must be able to adapt to the changes in technology over time. The private party has to manage the obsolescence and operational risks associated with technical innovation.

## 2.5 PRIORITISATION OF RISKS BY PPP PARTICIPANTS

Akintoye et al [22] surveyed both Clients and Contractors in the UK and found that government has a mistaken belief that the private sector willingly accepts risks. The interviewees further suggested that government should be considered as a party that could also bear more risks associated with PPP projects. Scores in Table 2.1 show that different PPP participants prioritise project risks differently. For example, the Private party ranks the design risk as their first priority risk while the Government rank design risk at number 5 and believe that commissioning risk is their highest priority.

### RANKING OF PPP RISKS BY CONTRACTORS, CLIENTS AND LENDERS

RISKS	RANKING OF RISKS			
	CONTRACTORS	CLIENTS	LENDERS	ALL
Design risk	1	5	10	1
Construction cost risk	2	6	6	2
Performance risk	4	2	8	3
Risk of delay	7	3	7	4
risk of cost overrun	3	9	3	5
Commissioning risk	17	1	5	6
Volume risk	8	10	2	7
Risk of operating/ maintenance cost	9	4	13	8
Payment risk	10	14	1	9
Tendering cost risk	6	17	9	10
Contractual risk	5	11	15	11
Legal risk	11	19	12	12
Market risk	14	16	11	13
Residual value risk	16	12	14	14
Planning risk	13	18	19	15
Environmental risk	15	8	23	16
Safety risk	21	7	20	17
Financial risk	12	22	18	18
Credit risk	25	24	4	19
Possible change in government	20	20	16	20
Project life risk	19	13	26	21
Changes in international legislation	24	15	22	22
Development risk	18	21	24	23
Banker's risk	23	26	17	24
Debt risk	22	25	21	25
Land purchase risk	26	23	25	26

TABLE 2.1 (1 = most important) [22]

## **2.6 SUMMARY**

Under the PPP method of procurement, Government is responsible defining the nature of the public services to be rendered through a clear set of output specifications. The private party is responsible for the design, finance, operations and maintenance of the facility. The associated risks pertaining to these areas of responsibility are borne squarely by the private party. This represents a significant amount of risk being transferred from the public sector entity to the private party and requires a comprehensive risk management strategy to ensure that the consequences of these risks are minimized, if not totally eliminated. These risk management strategies are discussed in the following chapters.



# CHAPTER 3 RISK MANAGEMENT

## 3.1 BACKGROUND

Risk management seeks to identify, prevent, contain and mitigate risks in the interests of a project [39]. The risk management must be ongoing throughout the life cycle of the project and needs to be an iterative process, with a continual search for solutions, assessing of solutions and reassessing the risks. The risk management process consists of 5 main stages:

- Risk identification and comprehension
- Seeking risk mitigating solutions
- Appraise new or residual risks
- Evaluate or price risks
- Risk monitoring and control

The process begins with the understanding and identifying of the risks inherent in the various areas of responsibility in the project. Risk mitigating solutions are drawn up and if the risks are successfully eliminated by these solutions, then there is nothing to evaluate. If, however, solutions are found to counter these risks as opposed to totally eliminate these risks, then the cost implications of the mitigating solutions should be evaluated.

The results of the evaluation should be fed back to the identification and comprehension stage to reappraise the new risk profile of the project. Some risk mitigating solutions result in a new set of risks, which must in turn must be evaluated and assessed from the beginning of the process by identifying and comprehending the risks and then following the process through. The strong possibility of secondary risks emanating from risk mitigating solutions reinforces the need for the risk management process to be an iterative one and not discrete phases of identification, evaluation and mitigation. This iterative process of risk management is illustrated in Figure 3.1.

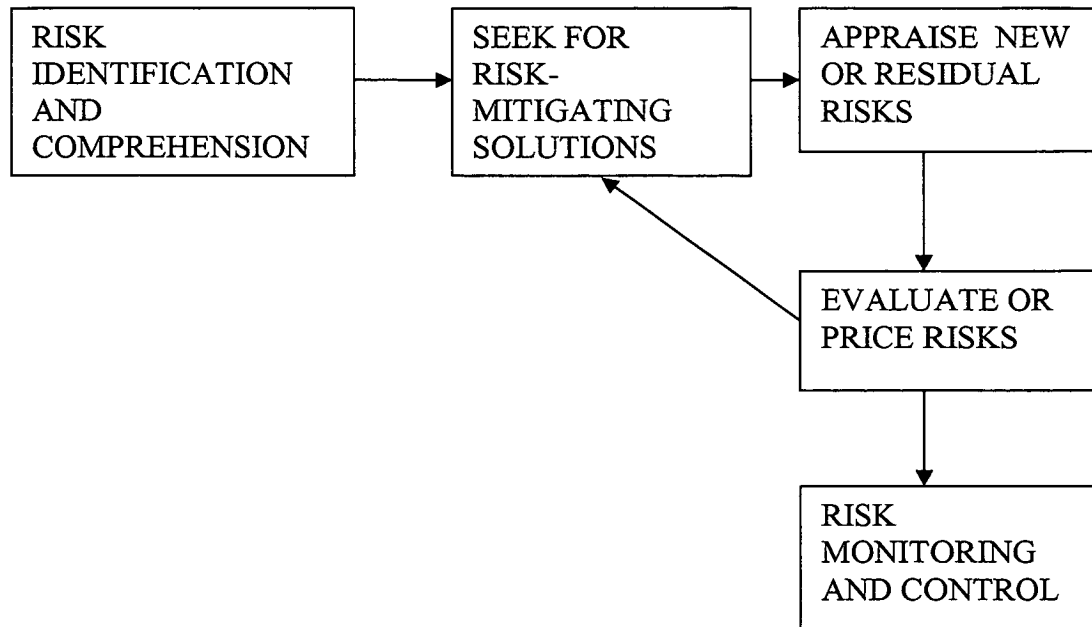


FIGURE 3.1 THE RISK MANAGEMENT PROCESS [adapted from 13]

### 3.2 RISK IDENTIFICATION

The first step in the risk management process is the identification and comprehension of the risks in a PPP project. Effectively PPP participants look at risks in the different phases of their projects: conception, inception, design, construction, commissioning, operations and termination. The sponsors, by their disposition, look at two principal risk issues:

- who bears the increase in cost and
- who bears the consequences of time delays in the project.

The following have been listed as possible risks in PPP schemes [20]:

- Site Acquisition (possibility of obtaining the wrong land, or the right land at the wrong price)
- Availability
- Feasibility studies (failure to identify key downsides with the intended project)
- Acquiring planning approval (unusual delays could arise, or permission may be denied for ill-defined schemes)

- Design (the technical solution may be unworkable or inefficient)
- Construction (there could be cost and / or time overruns, as well as poorly constructed solutions)
- Commissioning (may be delayed due to several unmet targets)
- Operating risks (including maintenance, malfunctions and delays)
- Demand (revenue) risk and its change may render facilities under utilized
- Occupation and usage risks over time could overstretch the capability limits of resources
- Obsolescence / technology risk could render a scheme unfruitful
- Residual value risk (achieving a high standard of facilities/ services at the end of the concession period can be difficult)
- Economic risks (including fall in revenue, financiers pulling out, etc)
- Legislative / regulation risks (eg. Future planning regulations, health and safety features, etc may affect the project adversely)
- Taxation risks (change in taxes / laws)
- Bid process being complicated, long and costly
- Political (government support for projects may not be forthcoming)
- Corruption
- Consortium structure (partners may be mismatched)
- Local partners (could pose interface problems or could use different systems and procedures)
- Project management ability (may be inadequate for the present task)
- Existing infrastructure
- Raw material (supply and availability)

- Financing (foreign exchange)
- Force Majure (circumstances beyond one's control)
- Market competition (could erode the potential gains of the projects)
- Revenue tariffs (may be lower than projections)
- Project Performance (may be lower than projections)
- Foreign exchange
- Inflation
- Financing risks

Below is a discussion of some of the key risks listed above:

### **3.2.1 Availability:**

The facility comprising the structures, buildings and systems that are to be installed by the SPV have to be in a state of completion that allows the public sector to render the service it intended.

### **3.2.2 Commissioning:**

Commissioning of the works has to be suitably planned so that the extent and timing of the commissioning takes place as planned. For example, there has to be power available to ensure that the commissioning takes place at the programmed time. The extent of the commissioning has to be of an intensity that ensures the professionals are satisfied that the installations of the works are as per specifications.

### **3.2.3 Construction:**

In most PPP projects, the construction works are sub-let by the SPV to the construction sub-contractor. This is usually done under a fixed-price contract. Historically construction projects are beset by time and cost overruns. In addition quality standards, health and safety issues remain of paramount concern. These concerns are not automatically removed from PPP schemes and the default of the sub-contractor can tarnish the reputation of the SPV in its bid to win further contracts.

### **3.2.4 Credit:**

As PPP schemes revolve around non-recourse financing, the different entities within the SPV need to be reputable to be able to obtain the financing required for the project.

### **3.2.5 Cost:**

A PPP project generally involves a concession period of 20 to 30 years. The public sector entity agrees an up-front price for the services and the challenge for the private party is to deliver the output specification to the required performance within the cost assumptions made at the outset of the transaction. So the private sector has to deliver the building to cost and to time and then it has got to provide the underlying services within the building to within the cost of repair and maintenance for a facility. Although the costs used by the SPV are generally index linked, the risk of predicting the cost of repair and maintenance over 25 to 30 years is carried by the SPV.

### **3.2.6 Demand:**

In most PPP projects, the risk of demand for the services rests with the public sector. The public sector has to ensure that the size of the facility and the range of services it is purchasing is in line with the current demand with the appropriate flexibility built in for future growth. Thus, for example, in a prison project, the SPV will not be concerned if all the cells are filled or not, as the risk will rest with the public sector to provide the prisoners to occupy the prison. In the two PPP prison projects in South Africa, the Government pays the SPV an amount for making a bed available for a prisoner. The risk of making the space available is that of the SPV, as highlighted in item 3.2.1 above. However the onus of providing the prisoners is that of the public sector.

### **3.2.7 Demographic changes:**

Closely related to the risk of demand is the risk of demographic changes resulting from, for example, an increase in population size or changes in public usage patterns. Demographic changes may also trigger off environmental risks.

### **3.2.8 Design:**

This is a fundamental risk to the private party as all the risks attributable to the design of the facility is transferred over to the private party. The inability of the government representatives to fully understand design concepts and the fact that the public sector have to produce a comprehensive set of output

specifications to inform the design compounds this risk. For example, the quality, size, aesthetics, etc for facilities are usually not fully comprehended by the public sector representatives until after construction has commenced when it is impossible or very expensive to change.

### **3.2.9. Environment:**

The impact of facilities and operating systems supporting the facility needs to be carefully considered as the responsibility is along term one as the private entity not only build the facility, but also operates and maintains the facility for a long period of time.

### **3.2.10. Finance**

The PPP project financial model is established and calculated upfront in a project and the effects of interest rates and inflation in the long term need to be considered. The risk of fluctuation and variance of these key economic fundamentals pose a high risk to the private entity.

### **3.2.11. Land:**

The responsibility of acquiring the land is a primary concern in a PPP project. After that who takes the risk that the land does not have antiquities on it, or is it going to be subject to subsidence? Added to these, the location of the land becomes vital as it also affects the acceptability of the project by those nearby it [17].

### **3.2.12. Legislative changes:**

Changes to the laws, regulations, and ordinances governing a country, province or city are an important factor because PPP deals are comprised of a complex collection of individual contracts. These contracts are negotiated and priced at a specific point in time and under a particular set of legislation and changes to the legislation can expose the SPV to additional costs.

### **3.2.13. Legal:**

These are different from legislative risks and deal with whether the parties contracting to the PPP are actually authorized and empowered to do so.

### **3.2.14. Market:**

This concerns the risk that the private entities that comprise the SPV are familiar with the market or industry from which the

public services are rendered. For example, facilities management companies that do not have the experience in the maintenance and operations of hospitals should not bid for those projects.

### **3.2.15. Operation:**

The risk that the facility will operate within cost and within the constraints of the concession agreement is probably the most significant risk and subsumes other miniature risks like security, energy consumption, welfare, communications, etc.

### **3.2.16. Performance:**

The SPV have an obligation to deliver the service stipulated by the public sector and if the service is not provided in accordance with the specification, the SPV could be penalized.

### **3.2.17. Planning permission:**

This can permit or deny a scheme. Planning permission must be obtained before a project can proceed in full. As a consequence of planning permission delays, PPP projects could be delayed to the point where they become non-viable. Social risk can have an impact on planning permission. If a notice needs to be served, or people have to be displaced and compensated, or wayleaves are involved in the project, then securing planning permission may be delayed [17].

### **3.2.18. Political:**

The risk of political instability or interference can affect projects.

### **3.2.19. Residual value:**

The risk that private sector sees in residual value is that the road, hospital or whatever meets an agreed specification for a period of time after it has been handed back to the client. For example, a road typically needs at least 10 years worth of life left in it when it is handed back. There is therefore a residual specification risk. The SPV must determine how much to expend in order to ensure that the facility is at a particular quality level when it is handed back to the client [17].

### **3.2.20. Social issues:**

This risk pertains to sections of the community opposing the project. This opposition could manifest itself in vandalism of the facility. Social risk is an issue that must be considered in a PPP

scheme early in the project life with extensive communication and engagement with community stakeholders to ensure that the project is socially acceptable and that there should not be any adverse consequence of the project.

### **3.2.21. Specification:**

This is a function of the design. The public sector normally states their requirements for a PPP project in terms of an output specification. The private sector is then responsible for designing the facility and its systems to achieve the detailed needs of the public sector. The design and specifications have to be correct and adequate in order to meet the specifications of the client and to fully satisfy the client. In addition, the specifications must meet health and safety and other statutory requirements. All of this risk is transferred to the private sector.

### **3.2.22. Sponsor:**

The level of commitment of the sponsors to the transaction and their ability to make decisions could pose a risk to the PPP project whereby a lack of commitment or delays in making decisions could delay or even abort a PPP project. Equity funding can be withheld if the sponsors are not seen to be willing and committed.

### **3.2.23. Technical:**

The effective and efficient functioning of equipment, materials, processes in accordance with the design and specifications is paramount especially in a hospital setting, for instance, where technical risks are primary, as theatre and other medical equipment have to operate effectively.

### **3.2.24. Technological obsolescence:**

The rapid pace at which technology undergoes changes almost makes it a certainty that the technology underpinning a certain service will become obsolete. The private sector entity has to ensure that the systems in place can be upgraded or changed to embrace the latest technology without adversely affecting the public service being offered. Most public sector clients expect to improve the level of their services and to keep pace with advances in the global market.



### **3.2.25. Time:**

This concerns the delays in the PPP project that could result from adverse weather, delays in decision-making by the client, change of mind by the authorities, strikes by the construction workers, etc.

### **3.2.26. Volume:**

Although this is closely related to demand risk, volume risk is about capacity, while demand risk is associated more clearly with usage. For example, on a road, there is traffic volume risk that must be forecast. In this case the road must be designed to sustain the number and types of vehicles that will use it. The demand risk on the road will pertain to whether the road is actually used by vehicles or not. Volume risk thus feeds back directly into the design [17].

The public sector party has the greater burden of risk identification because of the very nature of PPP procurement where the client's project documentation includes a risk matrix. The documentation will usually also set out a list of those risks which the public sector is prepared to take. The public sector will also identify those risks it feels the private sector should bear and those to be shared between the two sectors.

The onus then rests with the private sector to either accept the client's proposition or negotiate on the re-allocation of some risks. However, the spirit of co-operation prevails in PPP projects, and so some private sector consortia find themselves identifying all the possible risks that could beset the project, especially those that had been eliminated in the client's risk matrix. The private sector entities usually have a greater experience and exposure to their specific areas of expertise and are able to produce a more comprehensive list of key risks as opposed to the Government representatives.

There are different avenues through which an organization can identify risks [24]. Given that the risks facing a PPP project are many, different ways may be used to identify them.

## **3.3. RISK IDENTIFICATION METHODS**

The following methods of risk identification as identified by Chinyio et al [13] are discussed below:

### **3.3.1 Risk Identification through use of Personal and Corporate experience**

If an organization or consortium embarks on a PPP scheme without having done one before, it will face so many types of risks that it might be difficult to understand them all. Even after some risks have been identified, it is sometimes difficult to know what to do with them. However, experience acquired over time makes it relatively easier to identify the key risks facing the project. In this regard, a policy of dwelling in one or a few sectors is inadvertently helpful to risk assessment. For example, utility organizations that have been involved in water treatment will find it easier to identify the risks facing PPP waste management scheme because the core functions are not significantly different from what they are used to doing [13].

Apart from familiarity, specialization and experience also enable organizations to build databases, which can be used to draw insight for risk management. Databases serve as an information resource for diverse things like construction methodology, method statements, defect analysis, patterns of traffic, costs and prices. Checklists and risk matrices can also be developed from databases for future use. Also, through reviews of previous projects, there are some elements such as experience gained from a previous project that are useful to determine how to deal with current risks. While forming consortia, the constituent organizations scrutinize their potential partners to check for, inter alia, their level of experience and how it combines with theirs [13].

### **3.3.2 Risk Identification through Safety Reviews**

The systematic and thorough review of similar previous projects can provide valuable information and insight into what risks exist in the forthcoming PPP project. These reviews can be done on both on the projects that have been undertaken in-house by the organization or on projects undertaken by other public or private organizations wherever possible. These reviews are specifically aimed at identifying health and safety risks that can beset a project of a similar nature and involves a retrospective evaluation of what went wrong in the previous projects, what were the corrective actions taken and how safety standards were achieved in projects under study.

### **3.3.3 Risk Identification through Intuitive Insights**

Intuition plays a big part in risk identification. When you have got a risk like a potential change in law, there is nothing that will tell you definitely whether the law will change or not. You have to take a view of the future, and make provisions for it at the onset, so to some extent intuition is helpful to risk identification. Innovation is

encouraged in PPP projects, and experience may fail to identify what could go wrong with an innovative product. Intuition is readily available for pinpointing the long-term implications of innovative solutions [13].

#### **3.3.4 Risk Identification through Brainstorming**

The use of brainstorming workshops where all the relevant stakeholders gather around a table and share their expertise and insights in identifying possible risks can prove very effective if the workshops are structured and properly controlled. The use of 'collective intelligence' can often assist to unravel complex issues. The brainstorming workshops can also be used to produce solutions and risk mitigating strategies to the risks identified. These workshops should be an ongoing exercise through the project life cycle in line with the iterative process of identifying a risk, seeking risk mitigating solutions, appraising the residual risks, evaluating or pricing the risks and then reassessing the risks.

#### **3.3.5 Risk Identification through Site Visits**

The importance of site visits is the same for both PPP projects and projects procured conventionally. Site visits need to be undertaken by both the private sector and private sector parties. These visits enable the parties to identify issues such as site accessibility, wayleaves requirements, ground hazards, etc. The existing site conditions have to be appreciated by both parties as it impacts on the final agreed price paid for the services rendered. An example of this is the PPP project for the new Head Offices for the Department of Trade and Industry (DTI), where part of the site chosen for the new Head Offices was an old filling station site and had diesel and petrol tanks underground that were leaking over time resulting in both unstable geological conditions as well as a major environmental risk. The resolution of that risk impacted on the final agreed price.

#### **3.3.6 Risk Identification through the use of Organisation Charts**

The sheer size of PPP projects generally dictate that construction companies form Joint Ventures (JV) to be able to deliver the project in the time frames stipulated. The use of organisational charts can be very useful for assessing the personnel required to complete the project and the possible risks in terms of skills availability, experience of the available resources and competence of personnel available within an organization or set of organizations for a project, thus serving as a useful tool to identify bottlenecks and oversupply of resources for the forthcoming project. The organizational charts can

also help to identify risks associated with the way the different organizations would work together, each with their unique work ethics and culture, specifically in terms of communication styles, management style, reporting styles etc. If the construction companies have worked together previously in a similar JV, organizational charts allow the partners to undertake a re-appraisal of their employees which will cast a light on their new employees and their effect on the company profile.

### **3.3.7 Risk Identification through the use of Flowcharts**

Flow charts can be used to show the movement of building materials until they are placed on a concrete floor or component in a building. By depicting flows this way, it makes it easy to spot the processors (concrete mixer or other machinery) that can go wrong [13].

Flow charts can also be used to determine the number and capability of personnel needed to be at various locations along the line of flow. This flowchart system enables the private parties to identify the risks posed by employees, like absenteeism, mistakes, etc. The ability to identify these risks is particularly important as the penalties imposed on the consortium for non-delivery is severe and the need to understand and suitably plan and resource the different activities is critical in PPP schemes.

### **3.3.8 Risk Identification through Research. Interviews and Surveys**

In situations where the abovementioned techniques may not offer sufficient insight into some risks because of a lack of suitable information, the use of researches, surveys and interviews are useful in obtaining valuable insight and information. This method is particularly relevant for making enquiries when trying to understand the risks posed by social and community interests. An example of this is the effects of the proposed new Gautrain project on the residents and communities through which the rapid rail will pass and affect.

Researches, interviews and surveys are also useful tools for risk identification when the project is being undertaken in a geographical location where none of the parties have worked before. Useful information with respect to the planning procedures, approvals from authorities, supply of bulk services and other attributes and factors that are unique to that location can be obtained and the relevant risks identified

Research is vital where refurbishment works are involved, or where existing facilities will be utilized. Latent defects may be present in such buildings. Any organization going into such a contract will have

to price the risks on the basis that rectifying latent will cost them more money. Before such organizations signs the contract it should conduct a full intrusive survey of the property, where the opinion of surveyors and other consultants should be obtained [13].

### **3.3.9 Risk Identification through the Analysis of Assumptions**

A whole PPP project will be based on a series of assumptions. The design especially is often based on assumptions, when information on the client's requirements is not fully certain. An organization will have to continually go back to check these assumptions in the light of emerging information. It will also need to check whether the assumptions pose a real threat to the project. It is thus worthwhile to catalogue the assumptions that have been made in the course of a project's development, and to revisit them regularly [13].

### **3.3.10 Risk Identification through Consultation of Experts**

An SPV consists of different organizations with expertise in their own specific fields. The in-house expertise of these organizations generally is insufficient to assess the risks that relate to the SPV as a whole. In such circumstances, the use of external experts needs to be sought. These experts need to possess the relevant experience and expertise to be able to identify risks that the individual entities would not have been able to identify.

Consulting experts in the course of risk assessment is like an extension of the use of experience. Different experts specialize in different subjects and have the built-up experience that goes with their vocation. So, by using consultants, a consortium is acknowledging that they are not experienced in a particular subject, and that consultants know better and will be engaged to assist. For example, a traffic forecasting company was hired by one consortium, to help evaluate and explain the traffic risks facing a motorway project. Likewise an environmental company might be used to assess the environmental risks in a project. One trait of a PPP project is that the consortia always has to hire a lot of experts, for example legal, financial, design, environmental, planning, etc. Such consultations ensure that many risks are inadvertently identified and mitigated before the construction is embarked upon [13].

### **3.4. SUMMARY**

Risk identification is very crucial because if the risks facing a project cannot be determined soon enough, then any or some of the risks can materialize at any time in the life of a project and interfere with the achievement of the project's objectives.

Risk identification is not a task that should be approached casually, even by the most experienced organizations. Adequate time and effort needs to be set aside to undertake the exercise of risk identification and the process has to occur throughout the project life cycle at regular intervals because new risks can often emerge, and risks which were previously minor could suddenly become key issues in a project.

The use of suitable methods to identify the risks is also crucial to the success of the PPP project. As illustrated earlier in Figure 3.1, the effective identification of the key risks that beset a PPP project is the first step in the risk management process and the following step of the evaluation and assessment of these risks is discussed in the next chapter.

# CHAPTER 4 RISK EVALUATION

## 4.1 BACKGROUND

After the identification and comprehension of the risks prevalent in a PPP project, the risks need to be evaluated and assessed with the intention of developing risk mitigating strategies and solutions.

The main objective in risk analysis is to enable decision maker to understand the nature and extent of the uncertainty associated with some variables used in a decision making process. A risk may materialize in the course of a project. There is no guarantee that it would, but if it did, there would be a consequence.

Through risk analysis, the private party consortia can analyse the various risks prevalent in the project and then develop a risk mitigation strategy to manage the risks.

There are two features that characterize a risk:

- The probability (chance) by which they will happen
- Their ultimate impact on the project, if they do materialize. [39]

An accurate assessment of these two aspects will enable the private party consortium to develop an appropriate plan of action.

The likelihood of a risk occurring often affects and is affected by how risks are allocated. Allocating a risk optimally, (to the party best able to control its occurrence and consequences), reduces the likelihood of the risk eventuating by giving the party an incentive to prevent its occurrence. That party is also likely to be in the best position to access information about the likelihood of the risk materializing and can therefore establish a realistic premium [39].

The likelihood of a risk occurring and the subsequent impact of this risk is used together to establish the priority of the risks in relation to the other risks on the project. This relationship of probability and impact can be graphed as a function of each other and a risk prioritization table established. The risks that have a high chance of occurring and its potential impact on the project is equally high, then such risks are viewed as high priority.

Caution needs to be exercised when establishing such a table of priority as the organizations sometimes tend to pay lesser attention to a low priority risk, if not ignoring it totally. The prioritisation of risks changes through the project life cycle and through the risk management process and the parties need to be constantly aware of

the changes. Therefore, risks cannot be mapped on a permanent basis, given their dynamism. What maybe a major risk today may turn out to be a minor risk tomorrow. Risk management growth and experience embellishes itself. And so with time, some ways of mitigating some known high risks are found and such risks become minor issues. Therefore the profile of risks is always changing and many risks are managed unconsciously. As each scheme is approached, the associated risks that impact heavily on it should be established [13].

Organisations should have in place a separate system to manage the low priority risks, thus freeing their staff to use their time and energies to address the high priority risks.

## 4.2 TYPES OF RISK EVALUATIONS

Because the risks are prioritized, there is a need for some form of assessment where the two factors that characterize a risk can be suitably assessed. These assessments can be qualitative, quantitative or somewhere in between and the amount of information and time available and the need for the assessment determine the type of evaluation to be utilized. This is illustrated in Table 4.1 below:

TYPE OF ASSESSMENT	OUTLOOK
QUALITATIVE	Both probability and impact are assessed subjectively
SEMI-QUANTITATIVE	Probability assessed subjectively but impact assessed objectively
FULL QUANTITATIVE	Both probability and impact assessed objectively

**TABLE 4.1. RISK ASSESSMENT CLASSIFICATION [13]**



### **4.3 ASSESSING THE PROBABILITY OF RISKS**

Statistical analysis is ideally employed to assess the chance of a risk happening. For instance, it can be estimated that the probability of the mechanical works delaying the project is 0.17%. Such a figure can be derived from past records of similar delays. " Bayes Theorem' can be used to combine the statistics of previous events to derive the probability of a complex scenario [26]

The probability of a certain occurrence can be estimated from previous experience.

However most risks are difficult to quantify in terms of measuring their probability because the underpinning information is usually unavailable or insufficient. There is very little historical data to call on. In the absence of reliable information, a subjective estimation of the probabilities might suffice.

### **4.4 ASSESSING THE IMPACT OF RISKS**

Organisations are basically involved in PPP to make profit. So the impact of a risk on a project is what happens to the return on that project. For example, if an organization has planned to make 20% return on that project, if a risk materialized and the company had not made any provision for it, the impact of that risk on the project might be that their return will go down to, say 13% [13].

Now if they are not prepared for a return of 13% on their investment, then they should increase the percentage of their expected return. So the impact of the risks is usually assessed in terms of how it affects an organization financially.

Initially, risks are assessed on several dimensions, like potential delays to the project, embarrassment to be faced, effect on function or quality of product, etc. However, all these considerations are subsequently translated into financial terms. So, monetary units are ultimately used to assess the impact of risks [13].

### **4.5 RISK ASSESSMENT STRATEGIES**

Below is a discussion of the various risk assessment strategies that are used by organisations:

#### **4.5.1 Assessing every risk**

This strategy requires that every risk that besets a project is assessed and the consequent costs and time delay

consequences are priced into the bid. If the probability of the risk occurring is relatively high or if it is ascertained that the risk will definitely materialize, then it is probably safer to price its full impact into a bid.

The effectiveness of this strategy depends on the diligence of the risk assessors and requires a substantial amount of time and expertise to accomplish. However the end result of this exercise is extremely valuable to the decision makers within the consortia and can very easily provide the competitive edge to the bidder. This strategy is particularly relevant to sub-contractors, who may be facing fewer but higher-impact risks and. When the risks are few, it is also viable to assess their impact in detail.

#### **4.5.2 Assess every risk but model the price via probabilities**

This strategy takes into account most, if not all risks and the risks are priced. However their cost considerations are controlled through probabilistic considerations.

A simple example will illustrate this point.

The chance of failure of a component is assessed to be 0.15% and its financial impact is estimated to be R 100 000,00. Since the probability value of 0.15% is relatively low, an organization might decide that nothing will happen, and so feel unjustified in adding R 100 000,00 into their bid. However, if they add nothing at all, and the risk did occur, then they would lose R 100 000,00. So the company should strike a balance on how much to cover for each risk, or the whole combination of risks in the project. In simple terms, one way in which this risk will be priced by some organizations is;

$$\text{Risk cover} = 0.15 \times \text{R } 100\,000,00 = \text{R } 15\,000,00.$$

Instead of pricing R 100 000,00 into the bid for this risk, the analyst would add R 15 000,00, thus minimizing the extent to which the bid is beefed-up. The effect of each risk is considered in the foregoing manner and added into the bid. The cumulative effect of all risks is either obtained by summation, or through an integrative formula [27]

This strategy is based on the view that not all risks will manifest through the project life cycle, and that the amount priced to cover the risks will be sufficient to cover the risks that eventually materialize. However, striking the right balance between losses occurring on projects with many risks against those projects that make gains because of fewer risks is a

difficult exercise. Some organizations hedge their risk exposure by introducing an excessive buffer for the risks to guard against making a loss. Caution needs to be exercised when using the hedging mechanism as the extra costs incurred for the hedging could very well render the bid uncompetitive. Some organizations, in wanting to be competitive, introduce a lean buffer for risks, but this has the potential of exposing the organization to losses resulting from the costs of the risks materializing.

Different organizations adopt different policies in this regard, and for organizations involved at the top end of a PPP project, the risks are numerous and risk evaluation could very well be a bid-winning tool. These organisations realize that it is not feasible to price every risk and choose to concentrate on the key risks that could impact on the project. The key risks are assessed according to their probability of occurrence and the subsequent impact on the project and are classified into the different categories of probability and impact, as illustrated in Figure 4.1

PROBABILITY	HIGH	**	****	*****
	MEDIUM	**	***	****
	LOW	*	**	***
		LOW	MEDIUM	HIGH

IMPACT

FIGURE 4. 1 – PRIORITISATION OF RISKS

The risks that have a high probability of occurrence and a high impact on the project are grouped in the top right hand cell of the table. Similarly, the risks with a low chance of occurrence and having a low impact on the project are grouped in the bottom left hand corner of the table. The risks that sit on the upper right hand side of the table are usually priced in the bids, because their impact is high and they will almost always materialize in the course of the project with relatively high impacts.

Since the private sector party is usually a large and well established organization, the effects of lower end risks are not significant and the organizations tend not to price them in their bid, although these risks are acknowledged by the private party.

The pricing of the risks that lie between the top and lower end depends very much on how the organization manages the risks

and their willingness to forfeit profit should the risks materialize.

The decision to be reached should be judged on the basis that risks present opportunities for both gains and losses. If a financial provision is made for risks, and they failed to materialize, then the company will end up with excess profit. If, on the other hand, more downsides are experienced than the provision, then a loss will be incurred. So a balanced view has to be made as to what each organization is comfortable with, and striking the right balance is difficult [13].

#### **4.5.3 Benchmarking**

Another form of risk assessment involves the use of a template. This method is mainly used by organizations that have extensive experience and data available to them. A template or benchmark is established against which risks are assessed. The template is used as a starting point for assessing risks. When a current project is being assessed, its risks are compared with the template to see how their profile deviates from the template. However, the information on which a template is developed should be known to the users to enable them to account for the specificity of individual projects.

#### **4.5.4 Adjudication in risk evaluation**

There is a fair degree of subjectivity in risk evaluation and predicting their outcomes and probability is often done based on intuition informed by previous experience. Such decisions are made in a collective forum involving the key members who have the relevant experience and expertise to add value to this exercise. The adjudication of these risks are largely influenced by the commercial factors impacting on a project and with what the management of an organization are comfortable with. The lessons learned from previous projects play an important role in influencing the way management adjudicates the risks and how they price the risks. Management sometimes are prepared to take a loss in one project and not price in the risks in the hope that this loss is off-set by gains in another project where the effects of the risks have been priced in.

#### **4.5.5 Reactive risk assessment**

This method of assessment is used when organizations are comfortable to wait for risks to occur after which they are assessed and managed. PPP projects, by its very nature, are

generally very large and complex and it is impossible to identify every risk on a project. This method of assessment happens inadvertently anyway to deal with the risks that were not identified previously.

#### **4.5.6 Pro-active risk assessment**

This method of assessment entails that all the potential risks are identified in a pro-active manner and where, as far as possible, nothing is left to chance. The risks are identified up-front and the risk mitigating strategies applicable to these risks are developed up-front as well.

Financiers of PPP schemes often adopt a pro-active approach, especially since this form of procurement is based on non-recourse financing. They always question issues that can impede the progress of the project. They always want to be sure that a project will be completed on time and within budget. They also want to be sure that the PPP project will generate enough revenue to repay the loans [13].

However it is importance that reasonableness prevails when assessing risks and a balance must be struck in assessing risks pro-actively because of time constraints. The thoroughness of a risk assessment must thus be weighed against the cost and time available to undertake this exercise. Organizations need to decide on the depth in which the assessment is carried out as some risks are so basic that they are dealt with unconsciously, so that valuable expertise is not misapplied in addressing these items.

In attempting to optimize the cost and time spent on risk assessment, management can assign different risks to different personnel where, for example, senior personnel can deal with the high risks while junior officers are empowered to address the routine and minor issues. The various activities can then be put together in a co-ordinated manner.

#### **4.5.7 Sensitivity Analysis**

This method of assessment ensures that the cumulative influences of the risks on the project's objectives are assessed. Regardless of the manner in which a risk is evaluated, sensitivity analysis should be conducted to identify those risks that are going to have the most knock on impact on the project's objectives. Sensitivity analysis generally occurs after all the possible project risks have been individually assessed.

The impact of the risks on project price and time can be assessed, as well as running a check on other project features. If an organization has got a 3% capital cost risk on the 'change of law', which is capped at 3%, it can perform sensitivity analysis on this risk over 5 year periodic intervals. It could, for example be assumed there will be no changes in law for the first five years, but as the assessment stretches to 20 to 25 years, some effect on the project outcome is registered, albeit minor [13].

Sensitivity analysis is more often a numerical exercise in which risks are priced or assessed in other numbers and put into a model to determine their effects on different project features, for example, affordability. If, for instance, some risks impacted on the affordability of the project, then means of mitigating such risks should be sought. If, however, they cannot be mitigated to make the project affordable then the organization may wish to consider walking away from the deal.

Risk evaluation is the process that provides the information and data that is used in the decision-making process of developing risk mitigating strategies. These strategies are discussed below.

## **4.6 RISK MITIGATION**

### **4.6.1 BACKGROUND**

Risk mitigation involves finding solutions to counter the risks. Although risk analysis is important, it is ultimately aimed at facilitating risk management. Instead of simply pricing for risks, a way of getting round them is better. Risk mitigation is therefore an important stage in risk management [28]. Risk mitigation is also an iterative process and needs to be undertaken continuously through the project life cycle.

Irrespective of whether the particular risk is to be borne by the Private party or Government, it is in the interests of both parties to ensure that the risks do not eventuate. Therefore there is a strong incentive for each of the parties to actively manage risks throughout the project. Government also needs to be careful not to become overly involved in the management of risks, such that it ends up assuming risks that it had allocated to the private party [39].

## **4.6.2 Risk Mitigation Strategies**

There are four general risk mitigation strategies:

- Risk elimination
- Risk reduction
- Risk transference
- Risk retention

These strategies are discussed in the sections below. The discussions are based on practical interactions with PPP participants, and reviews of literature as recorded in [29] and [30]

### **4.6.2.1 Risk Elimination**

Risk elimination involves either the avoiding of a risk or the aborting of a risk. Risks can be avoided by completely eliminating the risk. These actions can be drastic, as in a Client refusing to proceed with a very risky project. A Contractor could refuse to bid for a very risky project, thus avoiding the risks that would have been faced.

### **4.6.2.2 Risk reduction**

Risks that are not eliminated need to be reduced to minimize the cost and time consequences of the risks on the project. A risk can be reduced by acquiring more information about that risk. Actions that could be taken to minimize some risks concern the redesign of facilities to minimize health and safety risks, interacting with unions to minimize disruptions to work, etc.

### **4.6.2.3 Risk Transfer**

The fundamental characteristic of a PPP project is the considerable transfer of design, financial and operational risk to the SPV.

Most SPVs in PPP projects do not retain many of these risks and transfer the design and construction risks to the construction subcontractor and their design professionals, the operational and maintenance risks to the operating subcontractor and the facilities management risks to the specialist FM service provider. Therefore, typically, the risks flow from the client to the SPV who then transfer the risks onto the subcontractors. Having transferred most of their tasks and risks, PPP consortia can afford to maintain lean structures, with very few key staff.

There is usually a flow down of many risks from the SPV because lenders do not want the SPV to bear significant risks. If the project site was suspected of being contaminated, the banks would want to see that an expert has tested and certified the site for the project to proceed. If inflation were to rise sharply, the lenders would want to be satisfied that the project would not be aborted.

It is usually more effective and efficient to transfer the risks to specialists who can handle them better. Therefore, PPP consortia transfer many tasks and risks to different experts, depending on the requirements of each project. In hospital schemes, some tasks are outsourced to organizations that specialize in catering, pottering, laundering, security, etc.

#### **4.6.2.4 Risk Retention**

Project risks that cannot be either eliminated or transferred need to be retained and absorbed by the organization. The risks that are suitable for retention by any organization are those with minimal consequences. Another criterion that influences organizations to accept risks is their ability to control the risks in question.

Different organizations retain different sets of risks, endeavoring to limit their exposure. The banks will definitely have a view on a company's decision, but the ultimate decision rests with the organization. The bank will have the concern of whether the organization will be able to repay the debt at all times.

#### **4.6.3. RISK MITIGATION TOOLS**

Public sector risk mitigation tools include:

- Research before issuing tenders
- Best practice tender and evaluation process
- Reducing scope for Agencies to assume risk unintentionally
- Developing a contingency plan in case of default
- Structuring payments with milestones so that there is minimal financial loss with default or poor performance
- Insurance as appropriate
- Recognition that value for money does not necessarily mean "lowest cost"

[39]



The private sector, generally, mitigate the significant portion of their risks by transferring the risks down to their subcontractors. In addition to risk transfer mitigation strategies, a number of tools can be applied. Chinyio et al [13] identified the following tools for the mitigation of risks. These tools are, generally, more prominent in the financial sector.

**4.6.3.1 Guarantees**

These are issued on behalf of the contractors by banks, governments, or their agencies to ensure that the client has recourse to compensation, in case of the contractor's default

**4.6.3.2 A Letter of Credit**

Is a form of guarantee, issued by the bank on behalf of a contractor that is operating overseas. The LOC entitles the client to withdraw cash on production of certain documents or upon fulfilling certain conditions. Usually the exercise of such right is associated with non-performance of the contractor

**4.6.3.3 Bid Bonds**

Are issued to safeguard the client, such that if and when a contractor's bid were accepted by the client, that contractor would not renege on entering into a contract with the client

**4.6.3.4 Performance bonds**

Are issued by a surety company to cover the aspect of non-performance on the part of the contractor

**4.6.3.5 Surety Bonds**

Are a form of guarantee that other forms of resolution would be sought, in the face of non-performance, before the cash withdrawal penalty is applied.

**4.6.3.6 Insurance**

Can be used to mitigate risks that cannot be managed in any other way. Insurance is usually used to protect an organization from the consequences of disasters

**4.6.3.7 Risk premium**

The equivalent of this term in construction is the contingency sum, which is usually added to an estimate to account for unforeseen eventualities that cannot be fully priced when an estimate is prepared

#### **4.6.3.8 Risk Adjusted discount rate**

Is mostly used in banking and business to adjust a risk free discount rate by accounting for the future inflation and extraordinary risks

### **4.7 THE ROLE OF ATTITUDES IN RISK MITIGATION**

Attitude can be viewed as a settled way of thinking. In terms of risk attitude, there is a suggestion that people and organizations can be grouped into three categories – risk loving, risk averse and risk neutral [31].

The risk attitude of a project participant will determine the courses of action taken in the faces of risks [32].

The three classifications of risk taking in relation to people and organizations are:

- risk neutral
- risk seeking or
- risk averse

The disposition towards risks is flexible and depends on the type and nature of risks being faced, and the magnitudes of the risks. In general, people are risk averse when the downside consequences are high, however attitudes can change with time and circumstances. When the impact of risk is small, construction organizations tend to be risk seeking. However, as the aggregate value risks increases, they increasingly become risk averse. The progression from risk seeking to risk aversion may be slow or fast. Risk analysts need to be wary that people's attitudes towards risk do influence their decisions and opinions. Each organization should know the level of risks they are comfortable with, and act accordingly. Being comfortable with risks depends in part on an organisation's competence. For example, while a construction company may be with the buildability of a complex design, it may not be very conversant with the efficient utilization of energy in the same facility

### **4.8. SUMMARY**

The analysis and evaluation of project risks provide the crucial data required to develop the appropriate and effective risk strategies. The extent to which the strategies and tools discussed above are applied to establish the probability of a risk occurring and to measure the impact of the risk on a project is highly dependent on the aversion an organisation has towards risk and their desire to be competitive in a bid.

However it is important that reasonableness prevails when assessing risks and a balance must be struck in assessing risks pro-actively because of time constraints. The thoroughness of a risk assessment must thus be weighed against the cost and time available to undertake this exercise. Organizations need to decide on the depth in which the assessment is carried out as some risks are so basic that they are dealt with unconsciously, so that valuable expertise is not misapplied in addressing these items.

The need for private sector organizations to be competitive, efficient and project a professional image in the industry drives them to endeavour to excel at risk mitigation, because, if a major risk with adverse consequences materialized in the course of a project, the event could generate bad publicity for the organization involved. Therefore, organizations endeavor to mitigate the risks facing their projects, especially the major risks.

The risks that beset a PPP project have different implications and invoke differing reactions and experiences with the different stakeholders in the process. The opinions and comments of these participants are discussed in the next chapter.

## **CHAPTER 5**

# **OPINIONS AND COMMENTS FROM PUBLIC PRIVATE PARTNERSHIPS PARTICIPANTS**

### **5.1 BACKGROUND**

Probably the best way to understand the complexities and risks in PPP projects is to learn from the experiences of participants and stakeholders that have been involved in the process. Their first hand experiences serve as invaluable information for the risk management process. Below are the opinions and comments of participants relating their experiences, comments and suggestions about the risks associated with PPP projects.

### **5.2. COMMENTS FROM NIGEL LOWE**

Nigel Lowe, a representative from the Institution of Municipal Engineering of Southern Africa states that "Municipal service delivery is complex and hence it is necessary for it to be governed through appropriate legal processes and practices,' He adds that the contract between the public and private sector is the pivot point and focus of all the roles, relationships and responsibilities that must be accommodated in the process. It is, therefore, important that a clear contract covering all the aspects of the PPP and the project be drawn up prior to starting the project. It is also important that contracts spell out the role and responsibilities of each party, including what the recourse will be if either party fails to perform. In order to put together sound contracts, Lowe suggests that all parties, particularly professionals, should come to the municipal service environment with long-term views and adaptability. They must be able to be brutally honest, mature and innovative, as well as risk-sharing and risk accepting. "there is currently the idea that we are too structured and inflexible in our approaches to contracting and hence our contracts are too rigid and inflexible," Lowe reports. Engineering must bring what it can to this environment, playing open cards with all the engineering inputs, processes and milestones.

However, according to Lowe, the right kind of PPP arrangements, especially in the current South African environment, will never be simple transfers or ownership-based, secure, water-tight, private and exclusive transactions worked out in small rooms. He suggests that engineering should contribute to creating a facilitative environment for all to recognize the right opportunities, where success is most assured and to draw other contributors into the process. All parties and professionals probably need to contribute and learn together in honest, contact and reality based. Simple, fair and equitable ways, Lowe notes.

He concludes by saying that PPP contracts must become milestones and performance-based and process-orientated, especially in the short term. That should be the measure of success but that is also what is needed if engineering and other professionals are to make its contribution to nation building, Lowe points out [37].

### **5.3. INVESTIGATION AT GLASGOW CALEDONIAN UNIVERSITY ON RISK MANGEMENT IN PPPs**

An investigation at Glasgow Caledonian University was undertaken by Chinyio et al [13] where several interviews were conducted amongst different stakeholders that were involved in PPP projects previously and their concerns are listed below:

#### **5.3.1 The absence of risk management culture:**

It was commented that getting people to remain committed to a formal working culture of risk assessment over the long duration of a PPP project was difficult and was struggling to take root amongst the key stakeholders.

#### **5.3.2 The efficacy of risk assessments cannot be ascertained:**

In view of the foregoing issue, a logical problem was unveiled concerning the efficacy of risk assessment. According to a respondent in the research under discussion, it is easy to add to the bid a premium of 22% for cost overruns, while in reality it may be 10%. Another interviewee remarked that although projects are being completed and are running successfully, the Client may not be getting optimal value for money. In most cases the Client is probably getting quite good value for money but not necessarily the 'best'.

#### **5.3.3 Lack of historic data to support risk assessment:**

As the PPP process is at its nascent stages, there is a lack of relevant historical data to support risk evaluation. In such cases there is nothing to measure against. Risk assessment in such scenarios was described as a speculative guessing game. The other problem with statistical analysis of PPP projects concerns the different characteristics of the projects. With road schemes for example, there are totally different types of roads with different characteristics. There is no relevant database now that captures the varieties of projects

#### **5.3.4 Recourse to subjective assessments:**

Because of this lack of historical data, the risks concerned are assessed on the basis of subjective judgment and there is no way to tell if a subjective opinion is right or wrong

#### **5.3.5 Differing perceptions on the magnitudes of risks:**

With the risk assessment process being largely subjective and undertaken by participants that have varying perceptions of the risks owing to their own experiences, the task of making a collective judgment could prove to be onerous and time consuming.

Also, because the different parties within the SPV have their own particular vested interests to protect, their view on the different risks that face the SPV may vary from party to party.

#### **5.3.6 Laid –back Clients:**

Clients are sometimes not forthcoming with respect to their precise requirements until a preferred bidder has been appointed. It often takes several months before a preferred bidder is selected and waiting that long to obtain information is frustrating to private sector participants. The lack of a clear strategy and unwillingness to make committed decisions are other perturbing issues attributable to Clients' passiveness. This is a high source of uncertainty, which is counted as a client induced risk. Clients are laid-back, partly because they do not thoroughly understand the PPP process.

#### **5.3.7 Occasional lack of requisite expertise:**

PPP projects, by their very nature, are complex and it is sometimes difficult to recruit technical experts who are adequately qualified to undertake the risk assessment. Consequently, it takes some time before each type of scheme passes through its learning curve, within which the relevant expertise may be insufficient, during which time risks could materialize on the project with cost and time ramifications.

#### **5.3.8 Long duration of PPP schemes:**

PPP schemes have concession periods which are generally in excess of 25 years. The length of such contracts gives rise to its own risks. Generally most staff and professionals from both the private and public parties

that started the project may not remain for the duration of the concession.

#### **5.3.9. The late start of risk assessment:**

A late start of the assessment in the course of the procurement process incurs rushing, and the missing out of vital details. The process should be embarked upon sooner rather than later, as has been the case in certain PPP projects.

#### **5.3.10. The dynamic nature of PPP risks:**

Key fundamentals that underlie a PPP project are bound to change over the duration of the project and risks pertaining to changes in law, demand volumes, interest rates and the like, are very difficult to assess, as risk analysts may not often know how much these will change. Environmental laws and the social acceptability of some schemes are also dynamic, and difficult to assess. In such situations, putting a value on risks becomes difficult, especially as risks have to be priced up-front in PPP, for periods of 25 to 30 years.

#### **5.3.11. The unstructured nature of risk assessment:**

In the private sector the understanding of some risks is sometimes based on the experiences and gut feelings of the assessors. The risk assessment process is not completely structured or documented. Other personnel within an organization may not be able to reproduce an assessment, as the expertise for doing so is not passed-on in a co-ordinated and structured manner.

#### **5.3.12 Transient Expertise:**

Most of the organizations that form part of the PPP consortium are big international organizations with diverse professionals. However, their employees sometimes move on, leaving a vacuum to be replaced. When that happens, in the course of risk assessment, a company can be caught off-guard without sufficient or requisite personnel to analyze their project risks. Although it is always possible to employ new hands, it is sometimes very difficult to get the right risk assessors at the right time, as there are not many out there.

## **5.4 COMMENTS FROM AN ELECTRONIC DISCUSSION FORUM – CANCELLATION OF PPP PROJECTS**

Another source of information on the experiences of stakeholders that have been involved in PPP projects previously was obtained from an electronic discussion forum [40]

**5.4.1 Author: Kaoru Yajima**  
**Posted: 2/17/2003 Email Author**  
**Organization: nippon koei**

“that success of a concession could hinge on the government's action during implementation of the concession. It is a government's responsibility to provide a reliable and safe service to the public (water, energy, transport) and if they are relinquishing this responsibility, it is up to them to lay the incentive for a capable concessionaire to enter the contract. The biggest mistake is for a government to go into privatization with a short-sighted financial plan, incomplete or flawed technical data, lack of public involvement during implementation, under-qualified maintenance staff, or simply privatizing for the sake of riding the privatization trend. During the planning stage, money must be spent during the primary stage to investigate, then divulge the consequences of privatization to all involved. An independent consultant, preferably with members of technical, environmental and social backgrounds, would be ideal”.

The salient points from these comments are that it is the primary responsibility of Government to provide a safe and reliable public service and if the Government chooses to jointly offer the service with a private partner, then it is critical that adequate time and costs are spent during the planning of the PPP project and the financial model that underpins the project is carefully and comprehensively drawn up.

**5.4.2 Author: C Dupuis**  
**Posted: 2/12/2003 Email Author**  
**Organization: Private**

“Mostly, private participation is a function of risk vs. return. When the potential investment profit diminishes to the level where potential investment profit is not attractive, the motivation for private investment vanishes. Currently Indonesia is a good example where the risks resulting from massive, institutionalized government corruption, inadequate legal protections and political and social unrest are all contributing towards the loss of investment capital”.



**5.4.3 Author: Michael Schur**  
**Posted: 1/24/2003 Email Author**  
**Organization: World Bank**

“The focus is to ensure that all stakeholders are appropriately incentivised to keep the project running smoothly when things go wrong. So, if projects terminate early as a result of concessionaire default, compensation (on the argument that some compensation is fair even though the concessionaire has defaulted because government receives an asset - road, waterworks, power plant etc.) is based on the notion of "market value", and there is no guarantee of debt repayment to lenders. "Market value" is simply the value of the unexpired term of the contract, as determined by a new potential concessionaire when the project is re-bid. The approach is presumed to work because it:  
increases the incentives for lenders to work with the contracting authority and the contractor / concessionaire to achieve a long term solution rather than terminate a project that hits difficulties;  
ensures that the contracting authority is no worse off as a result of the termination where lenders elect not to step-in;  
does not give the contracting authority a windfall gain on termination;  
does not discriminate against different classes of finance (guaranteed debt repayment to lenders is likely to encourage highly leveraged projects); and  
incentivises the incumbent concessionaire to operate the system properly during the re-bidding process, to ensure a higher market value”.

**5.4.4 Author: John Hodges**  
**Posted: 1/22/2003 Email Author**  
**Organization: World Bank, PSAPP**

“As raised in a few of the earlier postings, lack of transparency played a key role in the failure of many of the 48 projects. Very few of the projects were competitively bid and many were awarded "subjectively," to say the least. A factor equally as important to potential corruption in the awarding process, however, is the issue of information disclosure in the pre-awarding process. In many cases citizens just did not know what was going on. As a result public support was considered to be very low from day one in most cases, although improvements and expansions of services in the concession areas were needed. This raises an important issue of initial government failure to properly communicate the potential benefits and necessity of projects”.

These comments stress the importance of transparency and proper communication and information flow from the public sector at the start of the project. Active and constructive engagement of civil society

and other interest groups from the community is essential to minimize the social risks that could beset a PPP project.

**5.4.5 Author: Vrajlal Sapovadia  
Posted: 1/17/2003 Email Author  
Organization: NICM**

“effectiveness of projects can be undermined by legal discrepancies in agreements, lack of coordination between different agencies from concept to commissioning (monitoring, executing, accounting, inspection), unskilled manpower, lack of knowledge of appropriate technology, and indifference -- the contracting agency may neglect potential negatives of the project if long run factors are not assessed. These projects may be successful if will and skill are optimised to use the latest and best technology, and legal incompatibilities are reduced when drafting the initial agreement”.

**5.4.6 Author: Mukesh Rathod  
Posted: 1/16/2003 Email Author  
Organization: Gujarat Infrastructure Development Board**

“One of the main reasons for cancellation of projects is lack of transparency in selecting private developers. In many instances, this leads to favorable treatment of the selected developer and attracts opposition from users as well as political parties. It also opens up the possibility of renegotiation resulting from a change in government. One way to counter this problem is to have a strong legal framework in place which should lay down procedures for selecting developers and protecting the developer from political risk. Another main reason for cancellation of projects is poor structuring of the project itself. Most infrastructure projects are financially unviable on a stand-alone basis, and require government support for sustainability. Instead of responding by taking on fewer projects, governments can leverage their allocated funds for infrastructure by inviting private partners and attracting 3-4 times more investment. Hence, adequate legal structures, reforms and proper restructuring of projects can make a difference”.

These comments are particularly relevant to the proposed Gautrain project where the scheme is becoming more and more dependent on public sector funding as well and an entire debate has begun around the optimal use of public funds in the provision of public transport systems.

**5.4.7 Author: Clive Harris  
Posted: 1/15/2003 Email Author**

“All of these contributions have raised some good points. Much of the slowdown in investment, and some of the cancellations have arisen because investors’ expectations were not met. In some cases they overestimated demand for services. In others demand is there but governments have had trouble in maintaining the policy and regulatory frameworks required for running these services profitably. Investors will be right to act more cautiously, but this is more of a concern than misestimating demand”.

## **5.5 SUMMARY**

There is a growing call from PPP participants for appropriate legal processes and practices that govern the project which clearly state the roles and responsibilities for the different parties and, as Kaoru Yajima states, “the biggest mistake is for Government to go into privatization with a short-sighted financial plan, incomplete or flawed technical data”. Adequate time and money needs to be spent in the early stages of the project with the appropriate expertise around the table.

In addition there is a need for proper communication and information flow from the public sector at the start of the project. John Hodges argues that “the lack of transparency played a key role in the failure of many of the 48 projects”. Mukesh Rathod reinforces this view by stating that, from his experiences, the lack of transparency in selecting the private entity attracts opposition from users as well as other political parties.

There is also a strong view that a formal working culture of risk assessment needs to exist over projects and a comprehensive database be established to process and store relevant information on PPP projects. In addition, as pointed out by Clive Harris, the accurate estimating of demand, coupled with governments maintaining the policy and regulatory frameworks required for running these services profitably is fundamental to the success of a PPP project.

# CHAPTER 6

## 6.1 CONCLUSION

Risk cannot be eliminated in its entirety as it is part and parcel of any business. This is especially true in large engineering infrastructure projects undertaken with the PPP method of procurement because of, amongst other issues, the sheer size of the project, the different and complex relationships between the various parties and the time frames associated with these projects.

The information presented in this research dissertation on:

- The nature and characteristics of PPP projects
- Their unique risks
- Useful risk mitigation tools
- Experiences of other stakeholders

illustrates the importance to professionals in the Built Environment the need to understand the key issues that impact on PPP projects with specific reference to risk management issues.

We have seen that many of the risk issues are common to the main parties but their importance is variable, while some risk issues are particular to a specific party. Despite the range of issues and their possible downside it is clear that the approaches used to deal with them vary widely. Also, there are many practical risk issues that are considered important by the parties to the PPP but that it is not adequately reflected in the processes that address risk.

Extra care and special attention and planning needs to be paid throughout the project life cycle to ensure that the risks are managed and their subsequent consequences do not prove detrimental to the project.

This method of procurement is relatively new in South Africa and our construction industry is starting to embrace this method of undertaking large engineering infrastructure projects and it is hoped that this research dissertation has achieved the objectives of providing both professionals in our industry and decision makers in the public sector with relevant and valuable information and insight that could be used to improve on the current format and hence facilitate a process that enables PPP projects to be undertaken with greater certainty and efficiency.

## **6.2. RECOMMENDATIONS**

Possible recommendations to the challenges of risk management in PPP projects are:

### **6.2.1 The consolidation of a database for PPP risk assessment purposes:**

There is a critical need for participants to develop a database of reliable information on this type of procurement and also understand better which resources are most unreliable.

### **6.2.2 The training of risk analysts:**

Training programmes need to be conducted to train those organizations or personnel who are not conversant with detailed or current risk analysis of PPP projects.

### **6.2.3 Adequate time to be devoted for risk analysis:**

The time allocation for risk assessment should be scheduled into the project programme so that analysts have sufficient time for a thorough risk assessment. It should not be a rushed process.

### **6.2.4 Motivating a Client:**

Government sector participants who are laid back and do not have an appreciation of the time and cost constraints need to be motivated to be more forthcoming. In this regard, the payment mechanism could be structured to reward clients that are readily forthcoming with information and decisions

### **6.2.5 Seeking advice from experts:**

There are many types of risks in PPP, and one person may not be versatile enough to understand all of them thoroughly. Therefore risk analysts in PPP should not hesitate to seek external advice where necessary.

### **6.2.6 Detailed planning:**

The complexity and size of PPP projects demand that detailed planning is done by both parties before the signing of the deal.

### **6.2.7 Adopting a more structured approach:**

There needs to be a structured approach to risk management with a formal framework setting out exactly what the process will be. This structured approach also encourages transparency in the process.

### **6.2.8 Risk Assessment should not be over-engineered:**

Discretion should be exercised when determining the extent to which risks are assessed and managed. It is the reliable identification of the risks that pose the greatest threats and the alternative solutions for ameliorating risks should be exerted, before pricing those that cannot be avoided.

### **6.2.9 Standardisation of risks:**

One way of alleviating the risk assessment difficulties is to have a greater standardization of these risks through standard contracts. Such standardization would circumvent the risk identification phase and enable participants to devote more time to finding risk management solutions.

In addition, because the PPP procurement method is still in its nascent stages in South Africa, it is also a recommendation that extensive survey be undertaken of the relevant local stakeholders. This survey can attempt to establish the local hierarchy of risks prioritization, our unique risks that beset South African projects and possible suggestions on how the risks experienced in previous projects could be identified and dealt with sooner. This survey can be used as the first set of data for the establishment of a national database of risk management issues.

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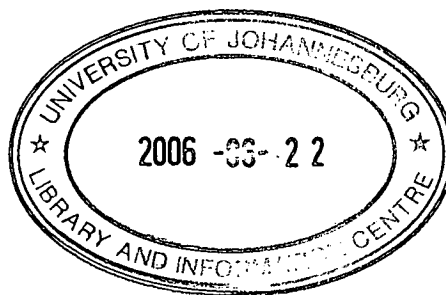
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